

## CLAIMS

1. A catalytic system comprising a catalyst comprising nanoporous or mesoporous palladium and an ion-exchange electrolyte.  
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2. A catalytic system as claimed in claim 1 wherein the catalyst further comprises one or more of platinum, gold, ruthenium, rhodium, osmium, iridium, silver, nickel, copper, cobalt, iron, chromium, lead, vanadium or tungsten.  
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3. A catalytic system as claimed in any one of claims 1 to 2 wherein the catalyst is Pd, PdPt, PdAu, PdPtRu, PdPtIr, PdPtAu, PdPtRuIr, PdPtRuOs or PdPtRuIrOs.  
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4. A catalytic system as claimed in any one of claims 1 to 3 wherein the ion-exchange electrolyte is a cation exchange electrolyte.  
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5. A multi-component catalyst comprising a nanoporous or mesoporous palladium and one or more of platinum, gold, ruthenium, rhodium, osmium, iridium, silver, nickel, copper, cobalt, iron, chromium, lead, vanadium, tungsten, carbon, nitrogen, oxygen, sulphur, selenium, tellurium or phosphorous.  
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6. A process for the production of a catalyst as claimed in claim 5, said process comprising solidifying one or more metal precursors in the presence of a templating agent and then removing the templating agent.

7. A process for the oxidation or reduction of inorganic and/or organic molecules comprising contacting said molecules with the catalytic system as claimed in any one of claims 1 to 4 or the catalyst as claimed in claim 5.
- 5 8. A process as claimed in claim 7 wherein the organic molecule has from one to twelve carbon atoms.
9. A process as claimed in claim 7 or 8 wherein the organic molecule is methanol.
- 10 10. The use of a catalytic system as claimed in any one of claims 1 to 4 or a catalyst as claimed in claim 5 for the oxidation or reduction of organic and/or inorganic molecules.
- 15 11. A process for the manufacture of a catalytic system as claimed in any one of claims 1 to 4 comprising contacting the catalyst with the ion-exchange electrolyte.
12. An electrode comprising a catalytic system as claimed in any one of  
20 claims 1 to 4 or a catalyst as claimed in claim 5.
13. A fuel cell comprising an electrode as claimed in claim 12.
14. A sensor comprising an electrode as claimed in claim 12.
- 25 15. A method for the detection of organic and/or inorganic molecules in a sample comprising contacting said sample with a sensor as claimed in claim 14 and detecting the current due to the oxidation or reduction of the molecules.

16. A catalytic system or a catalyst as substantially described herein with reference to one or more of the examples.
17. A process as substantially described herein with reference to one or  
5 more of the examples.
18. The use as substantially described herein with reference to one or more of the examples.
- 10 19. An electrode as substantially described herein with reference to one or more of the examples.
20. A fuel cell or a sensor as substantially described herein with reference to one or more of the examples.
- 15 21. A method as substantially described herein with reference to one or more of the examples.